SUBMISSION INSTRUCTIONS NO. 6

CLOSURE AND POST-CLOSURE CARE REQUIREMENTS

I. CLOSURE PLANS. [The requirements are contained in §§ 250.E.,260.E., 270.E., 320.C., 330.E., 340.E.,360E.,370.E., 380.B., 520.A.1e, 520.A.2., 530.F., 540.E., and 560. of Virginia Solid Waste Management Regulations (9 VAC 20-80-10) and in §§ 90. and 111. of Financial Assurance Regulations of Solid Waste Management Facilities (9 VAC 20-70-10).] Include a copy of the plans showing the final site topography indicating the appearance of the site, stormwater management features, and final contours at closing and a written plan consistent with these instructions. In accordance with ∋10.1-1410.2.A.1 of the Waste Management Act (Code of Virginia Title 10.1, Chapter 14), facility closure and post-closure activities must be performed as specified in an approved closure plan. Unpermitted facilities that are deemed appropriate to close in place must have an approved closure plan. A closure plan is a required element of a Part B permit, and several components may be contained in other portions of the permit (for example, specifications and CQA plan). Facilities that do not have a Part B permit must have a closure plan that includes all required elements.

A. Closure Activities.

1. Closure Plan Time-Frames. [§∋ 250.E.3., 260.E.2., or 270.E.2., and § 520.A.2., 530.F., or 540.E., 9 VAC 20-80-10] Describe the reasoning behind the selection of the point in the facilities active life for which the plan is being developed and the determination of the over-all life of the facility. Discuss when specific portions of the landfill will reach final grades and be closed. Provide plan sheets showing the phasing of closure.

2. Closure Performance Standard. [§∋ 250.E.1., 260.E.1.a, 270.E.1., 330.E.1., 340.E.1., 360.E.1., 370.E.1., 400.E.1., or 470.E.1., 9 VAC 20-80-10] Describe how implementing the closure plan minimizes the need for post-closure maintenance and minimizes releases of waste or waste decomposition products.

3. Inventory Removal and Disposal. [§∋ 330.E.1.a., 340.E.1.a., 360.E.1.a., 370.E.1.a., 400.E.1.a. or 470.E.1. and § 530.F. or 540.E., 9 VAC 20-80-10] For those facilities where waste is not left in place at the time of closure, describe how the solid waste and residuals inventory will be removed and disposed. Describe how the solid waste management facility will be decontaminated. The description should contain procedures that will be followed during closure to manage solid waste residues, contaminated containment system components (e.g., liners), contaminated subsoils, structures, and equipment contaminated with waste and leachate. Describe the sampling and testing program used to verify decontamination of subsoils and equipment. Include the parameters and criteria used to verify decontamination. For unpermitted landfills that are closed in accordance with Part IV of the VSWMR, removal is the first option that should

be evaluated.

4. Closure. [§§ 250.E.1. and 250.E.5., 260.E.1., 270.E.1. and 270.E.4.c(2), or 320.C., 9 VAC 20-80-10] For all solid waste disposal facilities in which wastes or contaminated materials are to remain at closure provide a description of how the unit will be closed, including a description of the final cover to be established and its expected performance.

a. Surface Impoundment Stabilization. [§ 380.B, 9 VAC 20-80-10] If wastes remain in the surface impoundment after closure, describe the methods used to prepare the wastes for the final cover, how the free liquids are to be removed or solidified at closure, and the methods used to stabilize remaining wastes to support the final cover, including:

(1) Stabilization methods, equipment and materials. Describe procedures to stabilize the waste in order to provide a competent bearing surface for the final cover system.

(2) Required bearing strength of stabilized waste. Describe the required bearing strength of stabilized waste.

(3) Demonstration of stabilized waste bearing strength. Provide documentation of bearing strength of stabilized waste.

(4) Methods for bearing strength determination during closure. Provide procedures for determining bearing strength of stabilized waste.

b. Landfill Closure. [§§ 250.E.1b(1), 260.E.1b(1), or 270.E.1b(1), 9 VAC 20-80-10]. The cover design and installation procedures should be thoroughly described including CQA for all components. If this information is included in a Part B permit application in the Design Report, the appropriate sections may be referenced, otherwise the information must be provided in detail. The plan should include:

(1) Plan Sheets. Provide drawings showing cover layers and thickness, slopes, final slope topography, and overall dimensions. Items related to closure of the landfill must be included on site plans should be discussed in the Closure Plan. If on-site soil is to be used for closure activities, a plan sheet must be provided that indicates borrow sources, the quantity of soil available from each borrow source and the soil characteristics.

(2) Cap Description. Provide a discussion of each layer of the landfill cap. Reference the appropriate construction specification following the description of each layer. Support the discussion with the results of the calculations for the landfill capping system including any modeling conducted. The results of any models and calculations will be included in an appendix to the Closure

Plan.

(a) Description of Layers. Provide description of liners to be used, permeability, strength and thickness. Reference the appropriate specifications, if applicable.

(b) Description of Protective Materials. Provide descriptions of and reference any specifications for protective materials placed above and below liners.

(c) Soil Cap Construction Plan. Provide a soil cap construction plan including the thickness and properties of the compacted soil liner. Reference the construction specifications for the soil liner if applicable.

(d) Drainage Layer Construction Plan (not required). Provide a drainage layer construction plan, if applicable. Reference any specifications for the drainage layer if one is used. The design of the drainage layer must consider a means to release collected liquids to ensure effective performance of the drainage media. The quality control program for any geosynthetic drainage material should include laboratory testing for transmissivity under conditions that are representative of the proposed field installation conditions.

(e) Erosion Control Layer. Provide an erosion control layer plan including the common name, species and variety of the proposed cover crop.

(3) Final Slopes. Provide information that addresses the minimum and maximum slopes for the side slope and flatter, top slope areas. Discuss the design features that protect the final slopes from the effects of runoff and erosion. Reference appropriate calculations demonstrating the stability of the layers of the final cover system and the ability of the final cover system to effectively drain runoff during the post closure period.

(4) Maintenance Needs. [§§ 250.E.1b(1)(c), 260.E.1b(1)(c), or 270.E.1b(1)(c), 9 VAC 20-80-10]. Discuss how the cover system will function effectively with minimum maintenance needs. This may be demonstrated by considering soil, the type of vegetative cover selected, run-off control measures on the final cover and other factors. Describe how the calculations have demonstrated that the universal soil loss for the erosion control layer is less than 2 tons/acre/year. Discuss the erosion control measures used so minimize soil loss while vegetation is being established.

(5) Construction Quality Assurance Plan. If a part B permit has not been

approved that includes a CQA plan as part of the Design Report, provide a description of the quality control program that will be implemented to assure that the final cover system is constructed in accordance with the design and specifications. The plan must include test frequencies and methods for all materials and a description of construction procedures. A test pad should be constructed if a soil barrier layer is incorporated in the cover system design.

(9) Alternate Final Cover Systems. [§§ 250.E.2, 260.E.1.b.(3), 270.E.1.b(3), (9 VAC 20-80-10]. A demonstration must be provided that shows an alternate cover system is as effective at reducing infiltration and/or providing erosion protection as the final cover system specified in VSWMR.

5. Schedule for Closure. [§§ 250.E.3.a(4), 260.E.2.a(4), 270.E.2.a(4), 320.1.E.3., 320.2.E.3., 320.4.E.3., 320.5.E.3., 320.320.B., 320.8.E.3., or 320.15.E.3., 9 VAC 20-80-10] Provide a schedule for completion of closure. If the closure time period is to exceed the time limit specified in the regulations, provide justification for the extension of the period and the description of steps necessary to eliminate any significant threat to human health and the environment from the unclosed but inactive facility.

6. Posting. [§§ 250.E.5d(1), 260.E.4.c(1), 270.E.4.c(1), 320.1.E.4., 320.2.E.4., 320.4.E.4., 320.5.E.4., 320.8.E.4., or 320.15.E.4., 9 VAC 20-80-10] Describe how the closing site will be posted and how the customers will be notified. Provide the location and the design of the barriers erected to restrict access to a closed facility.

7. Notification. [§§ 250.E.5d(2), 260.E.4.c(2), or 270.E.4.c(3), 9 VAC 20-80-10] Provide the name of the local land recording authority that will be notified upon the completion of closure and the wording of the notification to appear in the deed of the facility.

8. Certification. [§§ 250.E.5.b., 260.E.4.b., of 270.E.4.b., 9 VAC 20-80-10] Provide the wording of the certification from a registered professional engineer indicating that the closure has been completed in accordance with the requirement of the regulations and the approved closure plan. Note that the certification must be submitted with the results of the QA/QC program.

B. Closure Calculations [§§ 250.E.1b(2), 260.E.1b(2), or 270.E.1b(2), 9 VAC 20-80-10].

1. Cover System Stability and Liquids Management. Provide the following calculations:

- Demonstration that the final cover system will be stable. Provide calculations showing that the factors of safety are adequate to prevent (sliding, tearing, or pullout) failure of the cover layers.
- An estimate of peak run-off and volume

(volume calculations are based on a 25 year 24 hour storm).

- Calculations showing that the final slopes will not cause significant cover erosion during

construction and throughout the post-closure period.

- Engineering calculations demonstrating free drainage of precipitation off of and out of the cover.
- Run-on and run-off control and diversion systems, including swales, piping, and ditches

2. Settlement, Subsidence, and Displacement. [§§ 250.E.1b(2), 260.E.1b(2), or 270.E.1b(2), 9 VAC 20-80-10].Describe potential cover settlement, subsidence, and displacement, considering immediate settlement, primary consolidation, secondary consolidation, and liquefaction. Include the following information:

- Potential foundation compression
- Potential soil liner settlement
- Potential waste consolidation and compression resulting from waste dewatering, biological oxidation and decomposition, and chemical conversion of solids to liquids

Describe the effects of potential subsidence/settlement on the ability of the final cover to minimize infiltration. Provide an estimate of the maximum amount of settlement of the final cover system that may occur. Additionally, an estimate of the settlement that must occur to result in failure of the final cover system must be provided for each component of the final cover.

Provide an analysis of the stability of slopes and dikes.

3. Freeze and Thaw Effects. [§§ 250.E.1b(1)(c), 260.E.1b(1)(c), or 270.E.1.b(1)(c), 9 VAC 20-80-10]. Provide data on the depth of frost penetration and describe the effects of freeze and thaw cycles on the cover. Describe the measures taken to mitigate these effects.

C. Construction Specifications. [§§ 250.B.18.c., 260.B.17.c., 270B.19.c. 9 VAC 20-80-10] If the Closure Plan is not submitted as part of a Part B application, the Closure Plan must provide appropriate construction specifications as part of the Closure Plan submittal. Construction specifications must be provided for all components of the landfill cap including any granular materials, synthetic materials, soils, and pipe.

D. Groundwater Monitoring System. [§§ 250.D., 260.D., or 270.D., 9 VAC 20-80-10] If Part B application does not include a module for groundwater monitoring, provide information demonstrating that the owner or operator complies with the requirements of 250.D., 260.D., 270.D and Appendix 5.6 as applicable.

E. Leachate Collection System. [§§ 290, 9 VAC 20-80-10] If the Part B application does not include a module for leachate control system design and operation, provide information demonstrating that the owner or operator complies with the requirements of § 290. If persistent leachate releases occur, the Department may require submission of a leachate management plan.

F. Gas Collection System. [§ 280., 9 VAC 20-80-10] If Part B application does not include a

module for gas control system design and operation provide information demonstrating that the owner or operator complies with the requirements of ↄ 280, if applicable.

G. Post-Closure Activities. [§§ 250.F., 260.F., or 270.F., 9 VAC 20-80-10].

1. Post-Closure Contact. [§§ 250.F.4b, 260.F.3b, or 270.F.3b, 9 VAC 20-80-10]. Provide the name, address, and phone number of the person or office to contact about the facility during the post-closure period.

2. Security. Demonstrate that there will be adequate security to limit access at the closed site during the post-closure period.

3. Inspection Plan. [§§ 250.F.4a, 260.F.3a, or 270.F.3a, 9 VAC 20-80-10]. Describe the inspections to be conducted and placed in the operating record during the post-closure care period, their frequency, the inspection procedure, and the logs to be kept. Provide an inspection checklist. The rationale for determining the length of time between inspections should be provided. The following items, as applicable, should be included in the inspection plan:

- Security control devices;
- Erosion damage;
- Cover settlement, subsidence and displacement;
- Vegetative cover condition;
- Integrity and remaining capacity of run-on and run-off control measures;
- Cover drainage system functioning;
- Leak detection system;
- Leachate collection and removal system;
- Gas collection/venting system;
- Groundwater monitoring system;
- Benchmark integrity; and
- Evidence of releases from the landfill, including leachate outbreaks and gas migration.

4. Maintenance Plan. [§§ 250.F.4a, 260.F.3a, or 270.F.3a, 9 VAC 20-80-10]. Describe the preventive and corrective maintenance procedures, equipment requirements and material needs. Describe the rationale to be used to determine the need for corrective maintenance activities. Include the following items, as applicable:

- Repair of security control devices;
- Erosion damage repair;
- Correction of settlement, subsidence and displacement; describe how any damage to the infiltration barrier layers will be repaired;
- Repair of run-on and run-off control structures, including sediment removal from conveyance and storage structures;
- Leachate detection/collection systems maintenance;

- Correction of leachate outbreaks;
- Gas collection/venting system maintenance and replacement;
- Groundwater monitoring well replacement and repair/maintenance;
- Mowing frequency; and
- Seeding and fertilization of the vegetative layer.

5. Monitoring Plan. [§§ 250.F.4a, 260.F.3a, or 270.F.3a, 520.A.1.g., 9 VAC 20-80-10]. A site monitoring plan sheet showing the location of all devices for the monitoring of leachate production, ground water quality and gas production and venting is required. This plan shall include a table indicating the parameters to be monitored for the frequency of monitoring before and during site development. This separate plan sheet is required only for sites with a design capacity of more than three acres. Smaller projects may display this information on other plan sheets for submittal.

a. Groundwater Monitoring. For facilities that do not have a part B permit, describe the monitoring to be conducted during the post-closure care period, including, as applicable, the procedures for conducting the operations and evaluating data gathered. If there is a full Part B permit, this information should be summarized.

b. Leachate Collection and Disposal. Describe the monitoring to be conducted during the post-closure care period, including, as applicable, the procedures for conducting the operations and evaluating data gathered. Provide an estimate of the maximum annual quality of leachate that will be generated during the post-closure period based on actual leachate production at the site.

c. Gas Collection and Venting. Describe the monitoring to be conducted during the post-closure care period, including, as applicable, the procedures for conducting the operations and evaluating data gathered.

d. Leak detection between liners. Describe the monitoring to be conducted during the post-closure care period, including, as applicable, the procedures for conducting the operations and evaluating data gathered.

e. Dewatering. If the design of the facility calls for the depression of the groundwater table in the vicinity of the facility, describe the mechanism for monitoring the groundwater level and procedures for maintaining the elevation during the post closure care period.

6. Post-Closure Uses. [§§ 250.F.4c, 260.F.3c, or 270.F.3c, 9 VAC 20-80-10]. Describe the planned uses of the property during and after the post-closure period. Discuss the measures that will be taken to protect the integrity of the landfill cover and other waste management features. Provide for the notification of approval by DEQ if the site use

changes during the post closure period.

7. Training. Describe how the owner/operator will assure that personnel responsible for operation, inspection, monitoring, and maintenance programs are qualified to perform these functions throughout the post-closure period.

II. CLOSURE AND POST-CLOSURE CARE COST ESTIMATE. [ɜ§90, 111, 112. of the Financial Assurance Regulations of Solid Waste Facilities (9 VAC 20-70-10)]. If applicable, provide a copy of the up-to-date closure and post-closure care cost estimate .

A. Closure Cost. [§ 111., 9 VAC 20-70-10] Provide a copy of calculations used to arrive at the estimates to cover the cost of closure when the cost would be the greatest and at the end of the useful life of the facility. Provide the rationale for determining the maximum cost. In calculating the costs the following factors shall be considered:

- The size and topography of the site
- The daily and weekly tonnage of waste to be received at the site
- Availability of cover and fill material needed for site grading
- The type of waste to be received at the site
- Landfill method and sequential landfill plan
- The location of the site and the character of the surrounding area
- Requirements for surface drainage
- Leachate collection and treatment system
- Environmental quality monitoring systems
- Structures and other improvements to be dismantled and removed
- Site storage capacity for solid waste, incinerator residue, and compost material
- Off-site disposal requirements
- An appropriate forecasted average rate of inflation over the period of the life of the site
- Vector control requirements

B. Post-Closure Care Cost. [§ 112., 9 VAC 20-70-10] Provide a copy of calculations used to arrive at the estimates to cover the cost of post-closure care. In calculating the costs the following factors shall be considered:

- The size and topography of the site
- The type and quantity of waste received
- Landfill method and sequential landfill plan
- The potential for significant leachate production and the possibility of contaminating water supplies
- Environmental quality monitoring systems
- Soil conditions
- An appropriate forecasted average rate of inflation over the period of the life of the site and the length of the post-closure care period
- Annual recurring costs
- Annualized non-recurring costs

- Total annualized costs multiplied by the number of years required for post-closure
- The location of the site and the character of the surrounding area
- The end use of the site

III. FINANCIAL ASSURANCE. [Article 4, 9 VAC 20-70-10] If applicable, provide a copy of the established financial assurance mechanism for facility closure and post-closure care. For detail see *Submission Instructions No. 9.*